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HARVESTING METHODS IN CANADA'S FORESTS:

A Discussion Paper from the National Round Table on the Environment and the Economy

Edited by

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The National Round Table on the Environment and the Economy

In its 1987 report on "Our Common Future" the United Nations "Brundtland" Commission on Environment and Development expressed optimism that the world could resolve its environmental and economic problems. It even predicted a new era of economic growth based on environmentally sound and sustainable development practices.

In response to Brundtland, Canada set up Round Tables on the Environment and the Economy, reporting to First Ministers. The National Round Table on the Environment and the Economy (NRTEE) was announced by the Prime Minister of Canada in 1988, and held its first meeting in 1989.

The National Round Table acts as a catalyst for change and for the development of consensus. It seeks to achieve its goals by forging new partnerships that focus on the link between the environment and the economy. It is an independent forum, chaired by Dr. George Connell, former president of the University of Toronto, and reporting directly to the Prime Minister.

Traditionally, Canada's institutions have been designed to bring together individuals and groups with similar interests or goals. However, the Round Table brings together the many competing interests in a forum where they can find common ground on which to take action for sustainable development.

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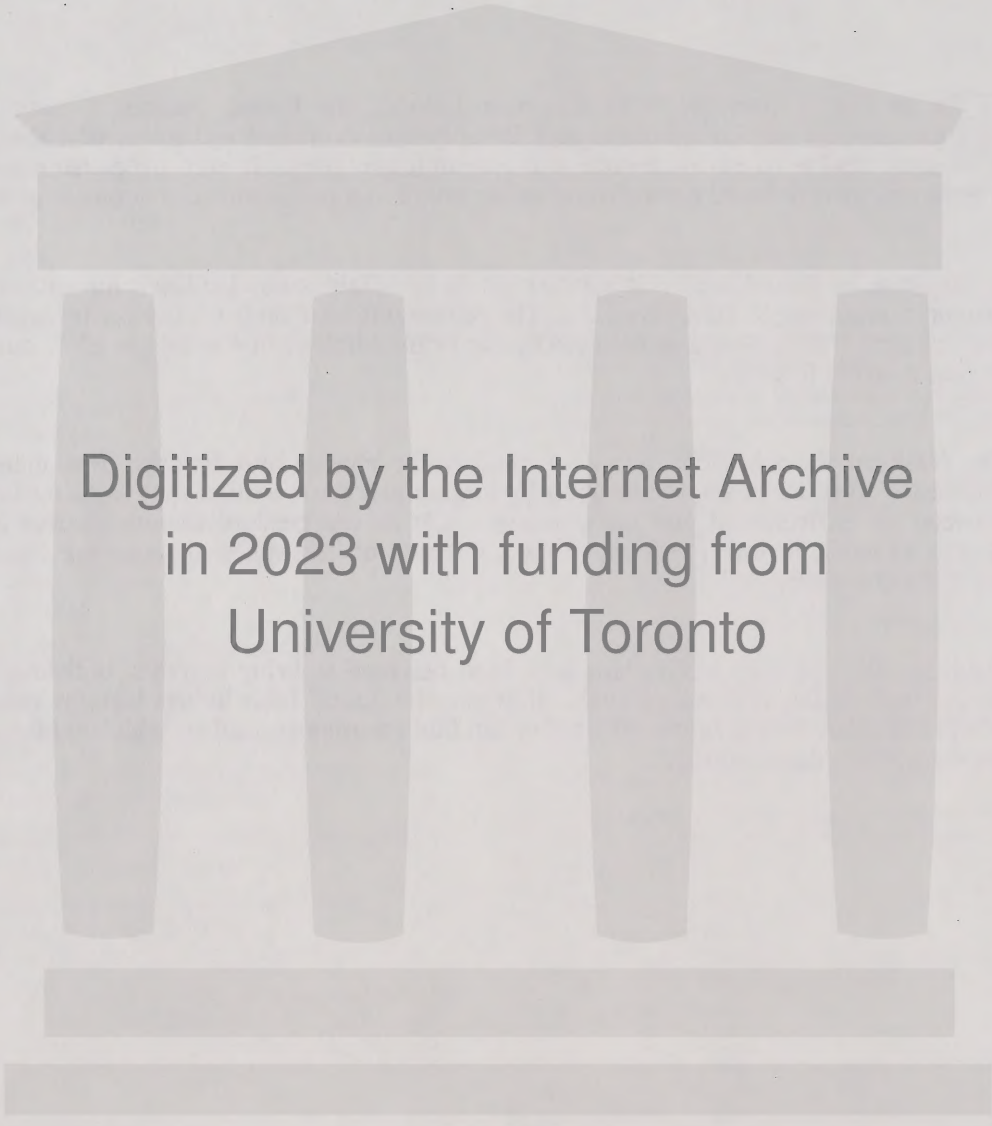

Selecting Harvesting Systems

During the summer and fall of 1990, the National Round Table on the Environment and the Economy (NRTEE) consulted with the main national stakeholders in the Canadian forest sector to invite them to join in a Round Table dialogue on sustainable development. The first Forest Round Table meeting took place in June 1991. John Houghton, a member of the National Round Table, and Chairman of QUNO Corp. (formerly the Quebec and Ontario Paper Company), led the NRTEE approach. Professor Hamish Kimmins of the University of British Columbia was invited to chair and facilitate the meetings. Some 25 stakeholder groups comprised a broad range of interests assembled to represent all of the values inherent in the forest. Participants agreed on, and worked towards, three objectives:

- ☐ **Develop a common vision and principles for sustainable development in Canada's forests.**
- ☐ **Each stakeholder agency to develop action plans for its own contribution to sustainable development.**
- ☐ **Recommendations to governments and other jurisdictions with regard to policies and actions for sustainable development.**

The Forest Round Table held nine two-day meetings from 1991 to 1993, and has also included several field trips to working forests across Canada to ground-truth some of the principles under discussion. Special effort was made in the early meetings to allow mutual confidence and respect to grow among stakeholders, so that progress made was the result of full discussion. In 1993, stakeholder organizations developed action plans for support of the principles, and highlights of those plans are presented in a final report available from the National Round Table.

Following their work on principles, members of the Forest Round Table undertook a broad discussion on the selection of timber harvesting systems. It did not prove possible, at national level, to arrive at one document which would apply to the many site-specific situations which are found across the country. However, The National Round Table undertook to publish its own summary arising from their discussions as a means of increasing understanding of different points of view on forest harvesting, and to stimulate discussion among people involved in and responsible for developing forest management plans and timber operating plans. This paper contains an amalgam of views, not all of which were accepted by all members, but it is hoped that regional and local planning groups will be able to build on this discussion when faced with decisions about harvesting methods in their region.

Considerable debate among members drew out three main aspects for consideration in making decisions on harvesting:

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1. Social Considerations

Canada is a forest-dependent society. The way of life and livelihood of most Canadians is bound directly or indirectly to forests. For some, this connection is immediate: most Aboriginal communities are in or near forested regions; hundreds of towns and villages depend on employment in the lumber, pulp and paper industries. On a broader scale, forests are crucial in the cycling of air and water. But the value of forests is not only a consequence of the material wealth they supply or the role they play in maintaining a habitable environment. We also value forests for enjoyment, renewal, inspiration and beauty.

The choice of harvesting system will have consequences for these various and sometimes conflicting values and interests. Not only should the effect of such choices on social values be taken into account, but equally important is the manner in which **people** are involved in these decisions. The Forest Round Table established six principles covering social aspects:

- **Public involvement in the forest policy, planning and decision processes is a right, of which responsibility and accountability are inherent components. An aware, educated and informed public is essential for effective participation in these processes. To these ends the public has a right to timely access to relevant information.**

- **Forest management practices and policy must recognize and make provision for the rights of Aboriginal people, reflecting their distinctive position and needs within Canadian society.**

- **The distinctive needs of forest-based communities and cultures are recognized as a major component in the sustainability of the forest.**

- **Worker health and safety must not be compromised in the sustainable development and use of forest lands.**

- **Public Health and Safety must not be compromised in the sustainable development and use of forest lands.**

- **Processes that recognize the inherent rights, accountability, and responsibility of the various stakeholders, and which provide opportunity for meaningful discussion within a mutually defined time frame, are vital to the resolution of conflict.**

1.1 Public Participation

One principle adopted above by the Forest Round Table is that public involvement is a right. But how should this right be expressed? The standards and principles for public participation are best established through a consultative process. A view expressed during discussion was that they might, for example, include the following:

- All people affected by decisions about harvesting methods should have the opportunity to participate in those decisions. This process should be both meaningful and equitable to all those affected. Social, cultural, technical, and economic barriers to participation should be overcome. Adequate resources to permit full and fair participation should be provided.

- The planning process should be accessible, comprehensive and clear. Trust and respect should be engendered among participants, and knowledge and understanding forged by all parties about social, environmental and economic considerations. Provisions for conflict resolution should be established at the outset.

- All parties should have timely access to and use the best available information on social, ecological, technical and managerial issues. Where new information must be gathered and used, all parties should agree on what is needed, how it will be prioritized and gathered, who will conduct the study, and who will bear the costs.

- The length of time for making decisions should be acceptable to all. Where public response is needed, reasonable lengths of time to respond should be provided.

Difficulties may arise determining the **degree of** public participation. For example, do those directly affected by forest harvesting operations and those affected less directly have the same rights to participate or does the public's right to participate increase in proportion to the consequences?

1.2 Goal setting, Shared Decision-making and Professional Judgement

Values to be protected, and criteria for their protection, should be established before a harvesting system is selected. Once such goals are established, what is the public's role?

- When broad agreements are reached, should citizens defer to technicians, scientists and other professionals? Or should they be actively involved in clarifying the meaning of such agreements through practical experience?

- How is public participation in decision-making implemented where laws establish professional responsibility for forest planning?

- Resource managers in government and industry are sometimes frustrated by the failure of public representatives to remain active participants in long-term planning processes. Conversely, public representatives may be suspicious of lengthy consultative processes sometimes referred to as "talk-and-log".

1.3 Aboriginal Peoples

- How can Aboriginal, land, and treaty rights, as well as traditional uses, intrinsic, spiritual and aesthetic values, be incorporated into timber harvesting decisions?

- Aboriginal and treaty rights require broad interpretation if they are to serve as the basis for increased Aboriginal involvement in forest use and management. Parallel consultative processes should be resourced and used as appropriate to facilitate Aboriginal peoples' participation to ensure that their interests in the forests are reflected.

1.4 Equity and Fairness

One goal of forest planning, and consequently, of the selection of harvesting systems is fairness and equity.

- Will the costs, benefits and risks associated with the choice of a timber harvesting system be shared fairly and equitably within society?
- Will private property rights be respected?
- Where traditional rights and uses are lost or degraded because of harvesting, will fair compensation be made?

1.5 Communities

- How will the harvesting system affect the quality of community life?
- What will be the effect of harvesting on sustainability of wood processing facilities, including such considerations as future yields, operating costs, and tree species available for harvest?
- Is public and worker safety protected?
- Are intrinsic values of the forest respected and preserved?
- Where hunting, trapping and gathering are important parts of the local economy, harvesting methods at the stand level and harvesting patterns at the landscape level should be designed to maintain the desired species and their food species. Traditional activities of hunting, fishing and gathering require the maintenance of forest habitat and biodiversity.

1.6 Public Participation on Private Lands

Private land owners have an obligation to consider the social implications of their actions. These obligations are proportional to the broader consequences of their actions. For owners of extensive private forest lands, these obligations may be likened to those established for operating on public lands. Public participation in decisions about timber harvesting on private lands is a more complex issue. It is impractical that every farmer, small woodlot owner or urban resident should have to hold, and pay for, full public meetings every time they wish to cut one or more trees. Yet private owners of large areas of forest landscape do have obligations to encourage public involvement where harvesting of timber on their lands may affect publicly-owned resource values (eg. water, wildlife, fish). Governments should look to local communities in establishing guidelines for public involvement in private forest lands. The Forest Round Table principle on use of private lands states:

- **In cases where public goals override traditional property rights of private land owners, the owners must be fully involved in planning such restrictions on land use as may be required, including the provision of incentives or compensation where appropriate.**

1.7 The Broader Planning Framework

Public involvement in the choice of timber harvesting systems fits within a larger land-use and forest planning framework. Goals and guidelines for selection of harvesting systems should be based on practical experience.

- When practical experience shows that guidelines and regulations fail to meet goals, does a process exist for their modification?
- What are the long-term social consequences for present and future generations of the choice of harvesting system?
- What are the consequences on areas adjoining those to be harvested (e.g. transportation)?
- Uncertainty is inherent in all we do, and values and knowledge change constantly. Is the planning process flexible? Can plans be adapted to new circumstances and uncertainties?

1.8 Accountability

- Participants in public decision-making processes should be accountable to the groups they represent and to all those affected by the decision.
- When public planning groups reach agreements, the participants should communicate the results of their involvement, demonstrating how various values and interests have been addressed.
- Governments responsible for approving harvesting system choices should provide clear justification to the public showing how concerns have or have not been taken into account.
- Monitoring of implementation should include assessment of and public reporting on the achievement of goals. The social, environmental, economic and management consequences of the choice of timber harvesting system should be reviewed and reported publicly on a regular basis through independent audits and evaluated against defined objectives.

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2. Caring for the Environment

Harvesting of forest products directly affects the forest and our local and global living environment. Plants, animals, soil microbes, hydrologic systems, cultural and recreational values, and others are all affected by harvesting activities - and should be taken into account **before** harvesting begins. Special consideration has to be paid to forest components that are already over-stressed, for example, threatened or endangered wildlife, critical habitats for fish, plants and other wildlife, and cultural sites.

The forest ecosystem is extremely complex, and the eventual choice of harvesting systems should take into account the cumulative impact of individual actions. The harvesting regimes applied to the various landscapes of Canada can have a profound influence on their beauty and aesthetic value. This aspect is often an under-valued and under-appreciated factor that shapes a significant portion of both public support and opposition to forest management plans. The fact that harvesting patterns, frequency and scale are often the first - and sometimes the main - source of objection to forest practices, necessitates a careful look at harvesting before the deed is done.

Members of the Forest Round Table established four principles covering environmental matters:

- **All activities on forested land should respect the intrinsic natural values of the forest environment and recognize the need to protect the integrity of forest ecosystems.**
- **Biodiversity should be maintained within the natural range of variation that is characteristic of both the local ecosystem and the region.**
- **Protected forest reserves such as ecological areas, natural areas, parks, wildlife reserves, and wilderness areas are essential components of a land use strategy.**
- **Canada should play a leadership role in its global responsibilities both in the way it manages its forests and in its contributions to the sustainable development of forests world-wide.**

Perhaps the most fundamental resource that can be significantly influenced by timber harvesting is the soil:

2.1 Soils

Timber harvesting can cause varying degrees of soil compaction, loss of organic matter, loss of nutrients, and slope instability. The choice of silvicultural system and harvesting equipment should reflect a careful evaluation of their short and long-term effects on soil stability, and its physical, chemical and biological characteristics. Aerial systems of log extraction, or harvesting during the winter when soils are frozen or snow-covered, should be employed where the physical impacts of ground skidding during the non-frozen period are unacceptable. Low ground pressure equipment and the use of logging slash to protect the soil are alternative methods of avoiding physical soil damage.

Most soil and site damage is associated with roads for harvesting, especially in steep slopes and areas of heavy rain. On the other hand, roads can reduce the need for logging equipment to move across unroaded areas. In general, roads should be kept to a minimum needed for effective management. Temporary roads should be put to bed where they pose a threat of future site damage. Permanent roads must be carefully engineered and adequately drained, culverted, and maintained. Midslope roads in steep unstable areas should be avoided. The water flows in and on such slopes should not be compromised.

Uneven-aged selection harvesting generally requires frequent entries into the stand with equipment, and more temporary roads than even-age management, especially clearcutting. Where soil compaction from frequent entries is a problem, clearcutting may result in more confined damage to the soil.

Removal of branches and foliage by tree-length or whole-tree harvesting can cause long-term reductions in site fertility, productivity and biodiversity, and should generally be avoided except where such logging slash prevents prompt regeneration and this problem cannot be solved by other means. Careful evaluation of coarse woody debris on a site specific basis should be undertaken. This should include considerations of forest protection from insects, diseases and fire), long-term soil fertility and wildlife habitat.

2.2 Hydrologic Systems

Timber harvesting can affect the movement of water into and through soil, leading on some sites to waterlogging, slope instability and soil erosion. Where these problems occur, water flow, water quality and fish habitat can be adversely impacted. In areas with wet soils, high rainfall or snow-melts, unstable slopes, or areas where soil water movements are easily disrupted, timber harvesting methods must be used that minimize the alteration of site hydrologic systems.

2.3 Site Microclimate

In some climatic regions of Canada, protection of seedlings from summer heat or growing season frosts may be vital to successful regeneration following timber harvesting. Where this is the case, clearcutting is not appropriate and even-aged (eg. shelterwood) or uneven-aged (eg. selection or small patch) harvesting systems should be used.

2.4 Wildlife Habitat at the Stand Level

Timber harvesting can remove critical habitat for some species while improving it for others. Snags, large live trees and coarse woody debris are used for shelter, nesting sites, resting or roosting sites, or to provide habitat for the food species of many native wildlife species including birds, mammals, amphibians and insects. The habitat importance of these ecosystem components varies from one forest type to another. Where they are important to the maintenance of desired wildlife species and stand level biodiversity, they should be retained, subject to public and worker safety considerations. Groups or patches of live trees left within clearcut areas can have great value for wildlife and should be encouraged where they will remain wind-firm and will not succumb to insects and disease. Patches of immature trees are often of great wildlife value and little commercial value, and should be considered for retention.

2.5 Wildlife Habitat at the Landscape Level

In many cases, the landscape pattern and rate of timber harvesting is as important, or more important for wildlife than the stand-level effects. Careful consideration must be given to these landscape-level effects. Large clearcuts can destroy habitats, while reduction in size of clearcut or patch logging can lead to the problem of habitat fragmentation. In certain situations, selection harvesting which requires frequent entries into the stand may cause more disruption to wildlife than the infrequent entries associated with even-age management.

In general, harvesting should mimic patterns of natural disturbance. A landscape pattern of different stand ages and conditions should be produced that will achieve specific landscape and wildlife objectives. Illegal poaching is increased by forest roads, so harvest systems that maintain a dense network of frequently-used permanent roads can have a greater negative impact than systems that restrict vehicular entry to large forest tracts to infrequent intervals.

The historical scale and frequency of forest disturbance should be mimicked by harvesting where the objective is to alter wildlife habitat at the landscape level as little as possible. Different scales and frequency of harvest disturbance may be used to achieve some different wildlife objective.

Winter habitat is very important in heavy snow areas. Landscape patterns and stand level methods of logging should retain adequate winter habitat in such areas. The landscape pattern should also ensure that animals are able to move between different habitat patches. In some cases this may require the retention of wildlife corridors until the regrowth of the forest provides appropriate cover for such movements. Timber harvesting should be timed to avoid negative effects on migratory species, and to avoid disruption of the reproductive period of desirable species of wildlife.

2.6 Rare, Endangered and Vulnerable Species

In parts of the world, species that require old forests for habitat have become threatened or endangered because of forest operations. Forest stands are often economically mature before they become biologically mature, and are often logged before they acquire the characteristics of old age. As old forests become rare, so do wildlife species dependent on them for habitat. Logging which creates new habitat boundary lines and many clearings favours edge species and early successional species while placing mature forest species at a disadvantage. Certain wildlife species are more vulnerable to disturbance than others and serve as good indicators of the impact of logging on forest ecosystems.

2.7 Streams

The major negative effects of timber harvesting on streams and fish habitat are caused by roads and bridges. Removal of streamside trees can also reduce streambank stability and inputs of fish food, and remove thermal cover and protection from predators. Over longer periods, the loss of streamside trees will reduce the input of coarse woody debris to streams. Such inputs are vital to the long term maintenance of stream diversity and fish habitat. On the other hand, if streamside leave-strips are not wind-firm, more damage to streams can result from large streambank trees being wind-thrown than their careful removal, leaving shrubs and smaller trees

to protect the stream. Streamside leave-strips also have important wildlife values. Deciduous trees are particularly valuable along streams.

Streamside leave-strips should be planned on a site and stream-specific basis. Their character will vary with stream and watershed order, forest type, the importance of the stream for fish and other wildlife, the shape of the stream bank, the climate, and the initial temperature of the stream water.

2.8 Cumulative Effects

Impacts of timber harvesting on soil, water movement, streams, vegetation, wildlife and other environmental values that seem insignificant or acceptable in any one year may become unacceptable as they accumulate over several years or decades. Evaluation of the impacts of harvesting must thus take a long enough view to assess the risk of these cumulative effects.

Timber harvesting should be evaluated as a part of an overall rotation-length, landscape-level management system. Many of the negative impacts attributed to timber harvesting are actually the result of subsequent site preparation and stand tending operations. Sometimes the need for these is determined by the choice of timber harvesting system, but frequently they are independent of it.

Assessment of cumulative effects requires the use of rotation length ecosystem management simulation models. Such tools should be used to put the evaluation of timber harvesting decisions into the overall context of the forest management system.

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3. Economic and Management Considerations

Canada's forests support a wide range of activities that collectively represent a cornerstone of our economy. These activities provide long term economic and social stability for rural communities, revenue to support a variety of social programs, and the economic base for our quality of life. Changes in viability and competitiveness of these forest-based activities can have serious implications for all Canadians. The choice of harvesting system must be based on sound economics as well as social and environmental considerations. Some of the Forest Round Table principles for managing resources include:

- **Economic health is integral to the sustainable development of forests. Economic and policy instruments should be consistent with the sustainability of a full range of values from forest lands.**

- **The costs of achieving sustainable development in the forest sector should be shared by all sectors of Canadian society. Compensation and new economic development strategies for dependent communities should be inherent components of sustainable forestry.**

- **Management of the forest will recognize the potential for sustainable development of the full range of forest resources and values.**

- **Forest lands should be managed under that combination of tenure systems which balances rights with responsibilities, encourages stewardship, optimizes the sustained supply of various values from forest lands, and contributes to fair and sustainable markets, and healthy communities.**

- **Sustainability of forest lands and forest uses requires that those who use the forest accept their obligations for its care through the development, application and reporting of user codes of practice covering all activities in the forest.**

Forest management, including the selection of harvesting systems, should provide long term economic and social stability for the community dependent on the forest and for the enterprises which draw raw materials and provide services from the forested area, as well as protecting the environment. The cumulative effects of forest practices, including timber harvesting, on the ability of the forest to produce an array of products must be considered in the resource planning and decision-making process, much as cumulative effects on the environment must be considered.

3.1 Harvest Volumes

The forest has the potential to produce a variety of income-generating goods and services. Social and environmental constraints affect the levels of these activities, especially the annual timber harvests. Where the forest is managed for a variety of resource values, the costs

associated with operations and investments in habitat, timber, preservation and recreational values should be shared between the different users in some equitable way.

3.2 Efficient Use of Management Inputs

Harvesting and subsequent silviculture operations should be designed to ensure that inputs such as equipment, labour and supplies are used efficiently, while minimizing negative effects on non-timber values. An evaluation of alternate harvesting and silvicultural equipment, or of using existing equipment in different ways, will help to identify new and more cost-efficient methods of timber harvesting. A related Forest Round Table principle states:

- **A comprehensive economic evaluation of the various options is an essential part of land use decisions.**

3.3 Selection Harvesting

Commercial thinning of stands is an aspect of timber harvesting, and is somewhat comparable to the frequent harvest entries in an uneven-aged forest. The potential impacts of commercial thinning on snag production and coarse woody debris in the stand and soil fertility should be considered. The cumulative effects of thinning plus final harvest may result in environmental effects that a final harvest on its own would not have. Against these possible negative effects should be set the possibility of higher yields of timber products and the higher value of the trees in the final harvest of the thinned stand.

3.4 Worker Training

The Forest Round Table adopted the following principle on worker education:

- **Sustainability of forest lands and forest uses requires broadly educated and skilled work forces at the vocational, technical and professional levels with continuing life-long education and training.**

Timber harvesting that is consistent with the Principles for Sustainable Development of Forests requires that forest workers responsible for timber harvesting be adequately trained in the issues covered in this discussion paper. This is seen as a key factor in achieving public acceptability of timber harvesting because so much of this important forestry activity is in the hands of these workers.

Conclusion

Sustainable forest management is that which takes as its first priority the maintenance of healthy forest ecosystems. On this foundation, harvesting systems can be found which meet present and future human needs while sustaining other life forms and ecological processes. Harvesting must include economically and environmentally sustainable operating methods which respect the ecology of local species and ecosystems, and the environmental values to be sustained at the landscape level. The methods chosen for timber harvesting must ensure that both the harvested products and the resultant environmental conditions meet the needs of society in general, of Aboriginal and local communities and other forest users, and of the international wood products market place. ■

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